EMISSION RATES FOR TAP/HAP & OTHER POLLUTANTS

AI ID: 2083 - Union Carbide Corp - St Charles Operations
Activity Number: PER19960009
Permit Number: 373-V0
Air - Title V Regular Permit Initial

All phases

Note: Emission rates in bold are from alternate scenarios and are not included in permitted totals

Permit Parameter Totals:

1,2-Dichloroethane: 0.38 tons/yr
1,4-Dioxane: 0.01 tons/yr
Acetaldehyde: 0.23 tons/yr
Acrolein: <0.01 tons/yr
Chloroethane: 0.17 tons/yr
Ethylene glycol: 6.12 tons/yr
Ethylene oxide: 3.81 tons/yr
Formaldehyde: <0.01 tons/yr
Hydrochloric acid: 0.10 tons/yr
Naphthalene: 0.85 tons/yr
Vinyl chloride: 0.17 tons/yr

Emission Rates Notes:

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OFFICE OF ENVIRONMENTAL SERVICES

STATEMENT OF BASIS

St. Charles Operations
TV Permit for Oxide 2 Unit
Union Carbide Corporation
Taft, St. Charles Parish, Louisiana
Agency Interest No. 2083
Activity Number PER19960009
Draft Permit 373-V0

I. APPLICANT:

Company:
Union Carbide Corporation.
P. O. Box 50, Hahnville, LA 70057

Facility:
St. Charles Operations, Oxide 2 Unit
355 Hwy. 3142 Gate 28, Approximately 2 miles west of Hahnville, on the west bank of the Mississippi River, off LA Highway 3142 at corner of LA Hwy 18
Approximate UTM coordinates are 746.184 km East and 3,319.222 km North, Zone 15.

II. FACILITY AND CURRENT PERMIT STATUS:

Union Carbide Corporation, a subsidiary of the Dow Chemical Company, owns and operates a chemical manufacturing facility in St. Charles Parish near Taft. The St. Charles Operations (SCO) is an integrated petrochemical manufacturing complex, converting petroleum-based raw materials into a variety of basic building block, intermediate chemicals and plastics. The products from this facility eventually wind-up in thousands of everyday household, business, and consumer products. The facility as a whole started operation before 1969.

Ethylene oxide is produced in the Oxide II Unit at Union Carbide Taft/Star Manufacturing Complex by reacting ethylene and oxygen over a catalyst. The oxygen needed for reaction enters the system with the air that is supplied via a gas turbine. Nitrogen is used as a ballast gas. Carbon dioxide, a byproduct of the reaction, is removed from the process through a Blowoff Oxidation Unit (BOU) and then out the waste heat boiler exhaust. The BOU contains catalyst that burns trace hydrocarbons leaving the system with the CO_2. The ethylene oxide is scrubbed from the system using water.

The oxide is then stripped from the water and sent to a series of stills where the oxide is concentrated and purified. Some of the purified ethylene oxide is sent directly to storage tanks to either be shipped as product or used by other facilities within the Taft Plant. The remainder of the oxide is reacted with water to produce ethylene glycol. The excess water from the glycol system is recovered via a series of evaporators and returned to the process. The monoethylene glycol is separated from the heavier glycols in a distillation column.

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Currently, the Oxide II Unit is operating under State Permit 476C (M3) issued January 8, 2001. The facility submitted timely applications for initial Part 70 Permits and continues to operate pursuant to the "application shield" provided in the program.

In addition, the facility has several state permits that will remain effective until replaced by a Part 70 permit. These include:

Permit #	Units or Sources	Date Issued
477 (M-1)	Unit 5 (Amines I)	4/25/1990
2446	Unit 8	12/5/1996
2214	LP-6	5/2/2000
476C (M-3)	Oxide II	1/8/2001
2656 (M-2)	Olefins Distribution Unit	3/25/2003

Several Part 70 permits addressing portions of the facility have already been issued. These include:

Permit #	Units or Sources	Date Issued
2257-V2	TB 1 & 2	11/14/1997 *
1909-V0	Polyglycols	10/21/1998 *
2520-00012-V0	Polypropylene Cypress Plant	8/10/1999
2689-V0	General Permit (Tank, TB1 & 2)	8/9/2000
2719-V0	Site Logistics	5/22/2001*
2751-V0	General Permit (Tank, Site Logistics)	10/13/2001
513-V1	Acrylics I	1/15/2002 *
2799-V0	General Permit (Flare, Unit8)	3/28/2002
2814-V0	Methyl Glycol Ethers (MGE)	10/31/2002
1912-V0	Specialty Products Unit	3/12/2003
2841-V0	General Permit, (Tank, Unit 5 (Amines I))	4/17/2003
898-V0	Unit 6 (Ethylene Amines II)	7/3/03
2864-V0	General Permit, (Tank, Unit 5 (Amines I))	9/4/2003
2847-V0	ASU	9/18/2003
2350-V3	LP-3 Unit	12/30/2003
2876-V0	Unit 9	6/7/2004

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Permit #	Units or Sources	Date Issued
2858-V0	PXC Unit	7/8/2004
2104-V0	Environmental Protection Dep. (EPD)	8/11/04
2422-V1	Olefins I & II	9/30/2004
476-V0	Oxide I	3/7/05
2343-V0	Energy Systems	6/27/05
1082-V0	Maintenance and General Facilities	9/10/05
2421-V0	Amines Plants	11/10/05

* Renewal application submitted

Finally, several applications for initial Part 70 permits addressing the remaining portions of the facility are still under review by the department. These include:

Permit #	Units or Sources
Grandfathered	Acrylics 2
Grandfathered	AP-2
Grandfathered	DAP

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III. PROPOSED PERMIT / PROJECT INFORMATION:

Proposed Permit

A permit application and Emission Inventory Questionnaire was submitted by Union Carbide Corp on October 12, 1996 requesting an Initial Part 70 operating permit for Oxide 2 Unit. A revised application dated December 31, 2002 as well as additional information dated October 19, 24, November 18, 2005, and January 16, 30, and 31, 2006 was also received.

Project Description

Union Carbide proposes the following changes:

- Operation flexibility for the storage tanks. The tanks are in dedicated service and will each be permitted to store the entire yearly throughput for that specific service to allow for tank maintenance, etc. This will result in a slight overestimation of VOC emissions from the tanks.
- Material composition updates for Emission Points 57A, 60C, 60E, 60G,196J, and 2300.
- Emission changes for Emission Point 50. These are due to changes in AP-42 emission factors and improved speciation of TAPs.
- Increase in hours of operation from the Tetralin Heater, Emission Point 58A, from 576 hrs/yr to 864 hrs/yr. The heater is used for start-up of Oxide 2, and additional time is requested to operate this equipment.
- Include permitted Emission Points 51, 52, 57A, and 60B under General Condition XVII.
- Include a system pressure vent, Emission Point 2301, as a new source under General Condition XVII.
- Increase in hours of operation from 13 to 23 hrs/yr, for Emission Point 2300, and also revision of its maximum hourly rate.
- Include permitted Emission Point 50A as an insignificant activity .
- Addition of ORS Vacuum Jet as a SOCMI HON Group 2 vent.
- Removal of SOCMI HON regulations from the Tetralin Surge Tank and Tetralin Collection Pot, Emission Points 58 and 58B

Section 6 of the Permit Application, dated December 31, 2002 lists the permitted emission rate before and after the updates (in tons per year) for each emission point in the permit. These changes are summarized in the Permitted Air Emissions Section, which follows.

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Permitted Air Emissions

Estimated emissions in tons per year are as follows:

Pollutant	Before	After	Change
PM_{10}	11.3	10.22	-1.08
SO_2	0.87	4.96	+4.09
NO_X	470	476.91	+6.91
CO	144	170.07	+26.07
VOC *	96.8	89.48	-7.32
Hydrogen Chloride	0.10	0.10	-

VOC LAC 33:III Chapter 51 Toxic Air Pollutants (TAPs):

Pollutant	Before	After	Change
Acetaldehyde	0.34	0.23	-0.11
Acrolein	0.02	<0.01	-0.02
Diethylene Ether (P-Dioxane)	0.01	0.01	-
Ethyl Chloride (Chloroethane)	-	0.17	+0.17
Ethylene Dichloride (1,2 dichloroethane)	0.22	0.38	+0.16
Ethylene Glycol	4.0	6.12	+2.12
Ethylene Oxide	3.2	3.81	+0.61
Formaldehyde	0.001	<0.01	-
Naphthalene	0.16	0.85	+0.69
Vinyl Chloride	-	0.17	+0.17
Total		11.74	

Besides the increases in hours of operation for the Tetralin Heater and Evaporator Vent, Emission Points 58A and 2300, increases in emissions are due to reconciliation for changes in emission factors and to correct a mathematical error in the original permit. Increases in VOC TAPs are due to improved speciation of VOCs.

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Prevention of Significant Deterioration Applicability

PSD analysis was not required as there are no significant increases in emissions.

MACT Requirements

This unit does need to comply with State MACT standards. Class I and II pollutants, regulated under LAC 33:III Chapter 51, are emitted.

UCC meets MACT requirement for the Oxide 2 Unit. All applicable requirements are provided in the Facility Specific Requirements Section of the draft permit.

Air Modeling Analysis

Impact on air quality due to emissions from UCC is below the National Ambient Air Quality Standards (NAAQS). Louisiana Ambient Air Standards (AAS) dispersion modeling was required for Ethylene Oxide, n-Hexane, Acrylic Acid and Vinyl Chloride. The Dispersion Model used was (ISCST3 Version 02035).

Union Carbide's dispersion modeling results predicts the ambient concentration for Ethylene Oxide, and Vinyl Chloride to be below the corresponding requirements for the Ambient Air Standard (AAS) provided in LAC 33:III.Chapter 51 Table 51.2.

General Condition XVII Activities

The facility will comply with the applicable General Condition XVII Activities emissions as required by the operating permit rule. However, General Condition XVII Activities are not subject to testing, monitoring, reporting or recordkeeping requirements. For a list of approved General Condition XVII Activities, refer to Section VIII of the draft Part 70 permit.

Insignificant Activities

All Insignificant Activities are authorized under LAC 33:III.501.B.5. For a list of approved Insignificant Activities, refer to Section IX of the draft Part 70 permit.

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IV. Regulatory Analysis

The applicability of the appropriate regulations is straightforward and provided in the Facility Specific Requirements Section of the draft permit, or where provided, Tables X and XI of the draft permit. Similarly, the Monitoring, Reporting and Recordkeeping necessary to demonstrate compliance with the applicable terms, conditions and standards are provided in the Facility Specific Requirements Section of the draft permit, or where provided, Tables X and XI of the draft permit.

V. Specific Conditions Determination

None

VI. Periodic Monitoring

The following periodic monitoring is done at the facility:

For Flare, Emission Point 60F, and the Blow Off Oxidation Unit (BOU), the following are monitored.

- Flow is monitored by flow indicator every 15 minutes.
- Presence of a flame monitored by flame monitor or heat sensing device continuously.
- Heat content monitored by gas analysis annually to insure the heat content is above 300 BTU/scf.
- Seal or closure mechanism monitored by visual inspection/determination monthly.
- Presence of a leak monitored by visual, audible, and /or olfactory annually or semiannually for fixed roof covers.
- Organic Hazardous Air Pollutants (OHAPs) are monitored using 40 CFR Appendix A, method 21.
- For the BOU the temperature is also monitored continuously.

For Flare 60E the heat content is monitored by gas analysis initially and every five years, or when process changes, and the presence of a flame is monitored continually.

For process vents, Emission Points 53, 54, 57, 60H, 60F2, and B3, flow is monitored by flow

indicator once every fifteen minutes and the seal or closure mechanism is monitored by visual inspection/determination monthly.

This unit is included in the Louisiana Fugitive Emissions Program Consolidation. Union Carbide conducts fugitive emissions monitoring in accordance with the specific conditions of this program (see Specific Requirement Section of draft permit).

Compliance with these specific conditions shall serve to comply with each of the several programs being streamlined. The overall most stringent program for Oxide 2 Unit is 40 CFR 63 Subpart H (HON).

VII. Glossary

Best Available Control Technologies (BACT) - An emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under this part which would be emitted from any proposed major stationary source or major modification which the administrative authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.

CAM - Compliance Assurance Monitoring rule – A federal air regulation under 40 CFR Part 64

Carbon Black - A black colloidal substance consisting wholly or principally of amorphous carbon and used to make pigments and ink.

Carbon Monoxide (CO) – (Carbon monoxide) a colorless, odorless gas produced by incomplete combustion of any carbonaceous (gasoline, natural gas, coal, oil, etc.) material.

Cooling Tower – A cooling system used in industry to cool hot water (by partial evaporation) before reusing it as a coolant.

Continuous Emission Monitoring System (CEMS) – The total combined equipment and systems required to continuously determine air contaminants and diluent gas concentrations and/or mass emission rate of a source effluent.

Cyclone – A control device that uses centrifugal force to separate particulate matter from the carrier gas stream.

Duct Burner – A device that combusts fuel and that is placed in the exhaust duct from another source (such as a stationary gas turbine, internal combustion engine, kiln, etc.) to allow the firing of additional fuel to heat the exhaust gases before the exhaust gases enter a steam generating unit.

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Federally Enforceable Specific Condition - A federally enforceable specific condition written to limit the potential to Emit (PTE) of a source that is permanent, quantifiable, and practically enforceable. In order to meet these requirements, the draft permit containing the federally enforceable specific condition must be placed on public notice and include the following conditions:

- A clear statement of the operational limitation or condition which limits the source's potential to emit;
- Recordkeeping requirements related to the operational limitation or condition;
- A requirement that these records be made available for inspection by LDEQ personnel;
- A requirement to report for the previous calendar year.

Grandfathered Status- Those facilities that were under actual construction or operation as of June 19, 1969, the signature date of the original Clean Air Act. These facilities are not required to obtain a permit. Facilities that are subject to Part 70 (Title V) requirements lose grandfathered status and must apply for a permit.

Heat Recovery Steam Generator (HRSG) – A steam generator that recovers exhaust heat from a gas turbine, and provides economizing and steam generation surfaces.

Hydrogen Sulfide (H_2S) - A colorless inflammable gas having the characteristic odor of rotten eggs, and found in many mineral springs. It is produced by the action of acids on metallic sulfides, and is an important chemical reagent.

Maximum Achievable Control Technology (MACT) - The maximum degree of reduction in emissions of each air pollutant subject to LAC 33:III.Chapter 51 (including a prohibition on such emissions, where achievable) that the administrative authority, upon review of submitted MACT compliance plans and other relevant information and taking into consideration the cost of achieving such emission reduction, as well as any non-air-quality health and environmental impacts and energy requirements, determines is achievable through application of measures, processes, methods, systems, or techniques.

NESHAP - National Emission Standards for Hazardous Air Pollutants –Air emission standards for specific types of facilities, as outlined in 40 CFR Parts 61 through 63

Nitrogen Oxides (NO_x) - Compounds whose molecules consists of nitrogen and oxygen.

Nonattainment New Source Review (NNSR) - A New Source Review permitting program for major sources in geographic areas that do not meet the National Ambient Air Quality Standards (NAAQS) at 40 CFR Part 50. Nonattainment NSR is designed to ensure that emissions associated with new or modified sources will be regulated with the goal of improving ambient air quality.

NSPS - New Source Performance Standards – Air emission standards for specific types of facilities, as outlined in 40 CFR Part 60

Organic Compound - Any compound of carbon and another element. Examples: Methane (CH_4), Ethane (C_2H_6), Carbon Disulfide (CS_2)

Part 70 Operating Permit- Also referred to as a Title V permit, required for major sources as defined in 40 CFR 70 and LAC 33:III.507. Major sources include, but are not limited to, sources which have the potential to emit: $\geq$ 10 tons per year of any toxic air pollutant; $\geq$ 25 tons of total toxic air pollutants; and $\geq$ 100 tons per year of regulated pollutants (unless regulated solely under 112(r) of the Clean Air Act) (25 tons per year for sources in non-attainment parishes).

PM_{10}- Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers as measured by the method in Title 40, Code of Federal Regulations, Part 50, Appendix J.

Potential to Emit (PTE) - The maximum capacity of a stationary source to emit any air pollutant under its physical and operational design.

Prevention of Significant Deterioration (PSD) – A New Source Review permitting program for major sources in geographic areas that meet the National Ambient Air Quality Standards (NAAQS) at 40 CFR Part 50. PSD requirements are designed to ensure that the air quality in attainment areas will not degrade.

Selective Catlaytic Reduction (SCR) – A noncombustion control technology that destroys NO_X by injecting a reducing agent (e.g., ammonia) into the flue gas that, in the presence of a catalyst (e.g., vanadium, titanium, or zeolite), converts NO_X into molecular nitrogen and water.

Sulfur Dioxide (SO_2) – An oxide of sulphur.

TAP - Toxic Air Pollutant (LDEQ acronym for air pollutants regulated under LAC 33 Part III, Chapter 51, Tables 1 through 3

Title V permit – See Part 70 Operating Permit.

"Top Down" approach – An approach which requires use of the most stringent control technology found to be technically feasible and appropriate based on environmental, energy, economic, and cost impacts.

Turbine – A rotary engine in which the kinetic energy of a moving fluid is converted into mechanical energy by causing a bladed rotor to rotate.

Volatile Organic Compound (VOC) - Any organic compound which participates in atmospheric photochemical reactions; that is, any organic compound other than those which the administrator of the U.S. Environmental Protection Agency designates as having negligible photochemical reactivity.

AIR PERMIT BRIEFING SHEET
AIR PERMITS DIVISION
LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

Vistalon Production Facility
Baton Rouge Chemical Plant
Agency Interest No. 286
ExxonMobil Chemical Company
Baton Rouge, East Baton Rouge Parish, Louisiana

Table 2. Explanation for Exemption Status or Non-Applicability of a Source

ID No:	Requirement	Notes
EQT574 T-3266 EQT575 T-3267 EQT577 T-3272 EQT580 T-3275 EQT581 T-3276 EQT582 T-3277 EQT 591 T-3305 EQT592 T-3306	NESHAP for Source Categories Subpart U-Surge Control Vessel Provisions [40 CFR 63.480(c)(8)]	DOES NOT APPLY. Vessel is not "in organic HAP service" and does not contain liquid containing organic HAPs.
EQT570 T-8 EQT576 T-3268 EQT578 T-3273 EQT579 T-3274 EQT583 T-3304A EQT584 T-3304B EQT585 T-3304C EQT586 T-3304D EQT587 T-3304E EQT588 T-3304F EQT589 T-3304G EQT590 T-3304H	NESHAP for Source Categories Subpart U-Surge Control Vessel Provisions [40 CFR 63.502(a) and Tables 3&4 to Subpart U]	DOES NOT APPLY. The source has a capacity less than 75 cubic meters.

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Table 2. Explanation for Exemption Status or Non-Applicability of a Source

ID No:	Requirement	Notes
EQT576 T-3268 EQT578 T-3273	NESHAP FOR Source Categories Subpart U-Storage Vessel Provisions [40 CFR 63.482 and Table 3 to Subpart U]	DOES NOT APPLY. The source does not meet the definition of storage vessels, since the capacity is less than 75 cubic meters.
EQT570 T-8 EQT579 T-3274 EQT580 T-3275 EQT583 T-3304A EQT584 T-3304B EQT585 T-3304C EQT586 T-3304D EQT587 T-3304E EQT588 T-3304F EQT589 T-3304G EQT590 T-3304H	NESHAP FOR Source Categories Subpart U-Storage Vessel Provisions [40 CFR 63.482 and 63.484(a)]	DOES NOT APPLY. The source does not meet the definition of storage vessels, since the capacity is less than 38 cubic meters.
EQT557 T-110 EQT558 T-120 EQT564 T-1928 EQT566 T-1979 EQT567 T-1980 EQT568 T-2001	NSPS Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels [40 CFR 60.110b(a)]	DOES NOT APPLY. No construction, reconstruction, or modification after July 23, 1984.